IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.:	10/657,206
Applicant:	Chae-Whan Lim et al.
Filed:	September 9, 2003
TC/A.U.:	2624
Examiner:	Alex Kok Soon Liew
Confirmation No.:	9142
Docket No.:	45682
Customer No.:	01609
For:	APPARATUS AND METHOD FOR RECOGNIZING CHARACTER IMAGE FROM IMAGE SCREEN

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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Board of Patent Appeals and Interferences
U.S. Patent and Trademark Office
P.O. Box 1450
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Sir:

This is an appeal pursuant to 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1-5, 7, 8 and 15-20 as set forth in the final office action of May 8, 2009 and the Advisory Action of July 31, 2009.

I. Real Party in Interest

The real party in interest in this application and the appeal is Samsung Electronics Co., Ltd. by assignment from the inventor recorded January 9, 2003 on Reel 014490, Frame 0698.

II. Related Appeals and Interferences

There are no known related patents or applications related to this invention on appeal or involved in an interference proceeding that may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. Status of Claims

Claims 1-33 are pending. Claims 1-5, 7, 8 and 15-20 stand finally rejected. Claims 1-5, 7, 8 and 15-20 are the subject of this appeal. Claims 6, 21 and 22 are objected to as being dependent upon a rejected claim, but would be allowable if rewritten in independent form. Claims 9-14 and 23-33 are allowed. Claims 1-5, 7, 8 and 15-20 are reproduced in Appendix A.

IV. Status of Amendments

No amendments were filed subsequent to the May 8, 2009 final rejection.

V. Summary of the Claimed Subject Matter

The present invention as claimed is directed to a method for extracting a character image from an image or picture screen, by means of a device having an image processing function, and pre-processing the extracted character image to convert it into a recognizable form. In particular, the present invention relates to a method and apparatus for recognizing a character image from an image or picture screen by means of a device having an image processing function and save the recognized character image in a set document form.

Exemplary embodiments of the present invention provide a method and apparatus in which a terminal device having an image processing function recognizes a character image from an image or picture screen and then saves the recognized character image in the form of a document. In other words, when the character image is recognized and the recognized character image is stored as the document in accordance with the embodiments of the present invention, a user's ability to input characters can be improved, a user manipulation of an input unit can be simplified, characters erroneously recognized in a character recognition process can be easily corrected by speech recognition, and a large amount of text can be input.

To substantially accomplish this, the terminal device of the present invention has a function for pre-processing the character image contained in an image screen before the character image is recognized from the image screen, a function for recognizing the character image from the pre-processed image, and a function for correcting erroneously recognized character information of the recognized character

image. Furthermore, in order for the erroneously recognized character information to be corrected, the terminal device of the present invention can be equipped with a user interface for correction having a speech recognition function necessary for correcting erroneously recognized characters by speech, a handwritten character recognition function necessary for correcting erroneously recognized characters on the basis of a handwritten character input, a function of displaying and selecting candidate characters similar to erroneously recognized characters and/or a function of inputting characters corresponding to the erroneously recognized characters with a soft keypad.

Independent claim 1 is directed to apparatus for recognizing a character image from a document (page 7, lines 6–16). The method comprises an input unit (e.g., a character recognizer, a speech recognizer, a pen and a keyboard - page 8, line 31 – page 9, line 12) for generating commands for a recognition mode, a correction mode (FIGs. 9, 13, 25A, 25B and page 7, line 6 – page 8, line 22) and a storage mode (FIG. 30, page 12, line 24 – page 13, line 14); a pre-processor (121 in Fig. 4, page 9, line 2 – page 11, line 34) for analyzing pixels of a document image in the recognition mode, classifying the document image into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis (FIGs. 5 and 9, page 20, line 10 – page 25, line 33), binarizing pixels of the BB and generating a pre-processed document image (FIG. 4 and page 17, line 29 – page 18, line 32). The method further comprises a character recognizer (123 in FIG. 1 and page 11, line 25 – page 12 – line 8) for recognizing the pre-processed document image and converting the recognized pre-processed document image into character data (page 8, line 23 – page 9, line 10); a recognition error processor (125 in FIG. 1 and page 12, lines 3 - 10)

for correcting or replacing erroneously recognized character data selected by the input unit with character data output by the input unit in the correction mode (FIGs. 9, 13, 25A, 25B and page 7, line 6 – page 8, line 22); a database (131 in FIG. 1 and page 12, lines 24 – page 16, line 11) for storing the recognized character data in the storage mode; and a display unit (115 in FIG. 1, FIGS. 26A to 26E and page 9, line 25 – page 12, line 2) for displaying the document image and character data generated during operating of the modes.

Independent claim 15 is directed to a method for enabling a terminal device to recognize a character image from a document image (page 7, lines 6–16). The method comprises the steps of (a) designating an operating mode for document recognition (page 9, line 29 – page 10, line 26); (b) analyzing pixels of the document image in the document recognition mode (page 20, lines 10-15 and page 40, lines 12-16), classifying the document image into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis (FIGs. 5 and 9, page 20, line 10 – page 25, line 33), binarizing pixels of the BB and generating a pre-processed document image (FIG. 4 and page 17, line 29 – page 18, line 32). The method further comprises (c) recognizing the pre-processed document image and converting the recognized pre-processed document image into character data (page 8, line 23 – page 9, line 10); (d) selecting erroneously recognized character data (125 in FIG. 1 and page 12, lines 3 - 10), and correcting or replacing the erroneously recognized character data with input character data in a correction mode (FIGs. 9, 13, 25A, 25B and page 7, line 6 – page 8, line 22); and (e) storing the recognized

character data in a storage mode (131 in FIG. 1 and page 12, lines 24 – page 16, line 11).

In dependent claims 2 and 16, the pre-processor of independent claim 1 comprises a skew correction part (920 in FIG. 4, FIGs. 9 and 13, page 11, line 10 – 15 and page 18, line 2 - 32) for classifying stripes having a preset length or above from the document image (page 18, lines 13 - 32), calculating direction angles of the classified stripes (page 18, lines 13 - 32), measuring a skew of an object (page 11, line 10 - page 18, line 32), deciding a skew angle corresponding to the measured skew and correcting the object skew (page 18, lines 13 - 32). The method further comprises an Region Of Contents (ROC) extension part (page 15, line 1 – page 20, line 6) for classifying the document image in which the object skew is corrected into CBs and BBs (FIGs. 5 and 9, page 20, line 10 – page 25, line 33), searching for positions of the CBs to extract the CBs (page 8, lines 23-30, page 17, line 15 – page 18, line 30) and extending a size of an image of the extracted CBs to a size of an input document image (FIGs. 14 and 16 and page 18, lines 25-32); and an image binarization part (page 15, line 1 – page 20, line 6) for comparing pixels of the CBs for the document image with a pixel threshold value (page 18, line 1 – page 19, line 25), binarizing the pixels of the CBs into pixels having brightness values for character and background pixels (FIG. 4 and page 17, line 29 – page 19, line 25), and binarizing pixels of the BBs into pixels having a brightness value for the background pixels (page 19, lines 16-25 and page 27, line 20 - page 28, line 23).

In dependent claims 3 and 17, the pre-processor of independent claim 1 further comprises a blurred-image detection part (FIGs. 5 and 8, page 14, line 28 - page 18,

line 12) for classifying the input document image into the CBs and the BBs (FIGs. 5 and 9, page 20, line 10 – page 25, line 33), calculating an average energy ratio for the CBs (page 18, line 1 – page 20, line 30), comparing the average energy ratio with a predetermined threshold value (page 18, line 1 – page 20, line 30), and determining whether the input document image is blurred according to a result of the comparison (page 18, line 1 – page 20, line 30).

In dependent claims 4 and 18, the pre-processor of independent claim 1 further comprises a noise reduction part (page 15, line 1 – page 18, line 33) for reducing noise of the extended image output from the ROC extension part and outputting, to the image binarization part, the image in which the noise is reduced (page 15, line 1 – page 18, line 33).

Dependent claim 5 is directed to a camera (107 in FIG. 1 and page 9, line 18-24) for detecting the document and generating the document image (page 9, line 17 – page 10, line 26).

Dependent claims 7, 19 and 20 are directed to a handwritten character recognizer (page 9, lines 2–8) for recognizing a received handwritten character image in the correction mode (page 11, line 25 – page 13, line 14) and converting the recognized handwritten character image into correction character data necessary for correcting the erroneously recognized character data (page 8, line 23 – page 13, line 14).

In dependent claim 8, the camera (107 in FIG. 1 and page 9, line 18-24) of dependent claim 5 adjusts a focal distance and exposure time (page 15, lines 16 – 31).

VI. Grounds of Rejection to be Reviewed on Appeal

The grounds of rejection for review on appeal are:

(1) the rejection of independent claims 1 and 15 and dependent claims 2 – 5, 7, 8 and 16 – 20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yokota (U.S. Patent No. 6,334,003) in view of Cullen et al. (U.S. Patent No. 5,465,304) and in further view of Nicholson et al. (U.S. Patent No. 6,661,919).

VII. Arguments

A. Independent Claims 1 and 15 and dependent claims 2-5, 7, 8 and 16-20 Are Not Unpatentable Over Yokota (U.S. Patent No. 6,334,003) in view of Cullen et al. (U.S. Patent No. 5,465,304) and in further view of Nicholson et al. (U.S. Patent No. 6,661,919).

Independent claims 1 and 15 and dependent claims 2 – 5, 7, 8 and 16 – 20 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yokota (U.S. Patent No. 6,334,003) in view of Cullen et al. (U.S. Patent No. 5,465,304) and in further view of Nicholson et al. (U.S. Patent No. 6,661,919).

Neither Yokota , Cullen et al. nor Nicholson et al., alone or in combination, disclose, teach or suggest such unique combinations of features or method steps, as recited in independent claims 1 and 15 or dependent claims 2 – 5, 7, 8 and 16 – 20. Therefore, claims 1-5, 7, 8 and 15-20 are patentable over the alleged prior art references of record.

Exemplary embodiments of the present invention provide a method and apparatus in which a terminal device having an image processing function recognizes a character image from an image or picture screen and then saves the recognized character image in the form of a document. In other words, when the character image is recognized and the recognized character image is stored as the document in accordance with the embodiments of the present invention, a user's ability to input characters can be improved, a user manipulation of an input unit can be simplified, characters erroneously recognized in a character recognition process can be easily corrected by speech recognition, and a large amount of text can be input.

1. Independent Claim 1 Is Not Unpatentable

Independent claim 1 is directed to apparatus for recognizing a character image from a document. The method comprises an input unit for generating commands for a recognition mode, a correction mode and a storage mode; a pre-processor for analyzing pixels of a document image in the recognition mode, classifying the document image into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis, binarizing pixels of the BB and generating a pre-processed document image. The method further comprises a character recognizer for recognizing the pre-processed document image and converting the recognized pre-processed document image into character data; a recognition error processor for correcting or replacing erroneously recognized character data selected by the input unit with character data output by the input unit in the correction mode; a database for storing the recognized character data in the storage mode; and a display unit for displaying the document image and character data generated during operating of the modes. These combination of features are not disclosed or suggested by the combination of the Yokota, Cullen et al. or Nicholson et al. patents.

The Yokota patent is cited for allegedly disclosing the steps of designating an operating mode for image character recognition, selecting and analyzing the image character recognition in image character image recognition mode, classifying the character image into at least one character block and recognizing the selected image character image. More specifically, the Yokota patent is cited for allegedly disclosing

the steps of generating and recognizing a pre-processed document image and converting the recognized pre-processed document image into character data.

The Yokota patent discloses that an image data is cut out from character region and a character recognition is executed. The Yokota patent further discloses executing character recognition with respect to a character region (alleged to correspond to recognizing a pre-processed document image and converting the recognized pre-processed document image into character data; the Examiner cites Fig. 3, A2 of Yokota).

Exemplary embodiments of the present invention disclose that an image of a document is detected using a camera embedded in a terminal device (such as a PDA), a character image contained within the detected image is pre-processed by a pre-processor so that a clear character image can be produced, the pre-processed character image is recognized by the character recognizer, and the recognized character image is converted into character data. Erroneously recognized character data is corrected using various devices such as a stylus pen, a speech recognizer, a handwritten character recognizer, a soft keypad, etc., and the character data is stored in a desired storage area of a database. (See page 9, lines 2-9 in the specification of the instant application).

There is no disclosure of generating a pre-processed document image in the Yokota patent, nor does Yokota teach or suggest the step of recognizing a pre-processed document image and converting the recognized pre-processed document image into character data. Thus, Yokota fails to disclose the steps of generating and recognizing a pre-processed document image and converting the recognized pre-

processed document image into character data, as recited in Appellant's independent claims 1 and 15.

The Cullen et al. patent is cited for allegedly disclosing the steps of analyzing pixels of a document image in the document recognition mode, classifying a document image into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis, binarizing pixels of a BB, and generating a pre-processed document image.

The Cullen et al. patent discloses a character recognition system, a method and apparatus for segmenting a document image into areas containing text and non-text. In Cullen et al. patent, document segmentation is comprised generally of the steps of: providing a bit-mapped representation of the document image, extracting run lengths for each scanline from the bit-mapped representation of the document image; constructing rectangles from the run lengths; initially classifying each of the rectangles as either text or non-text; correcting for the skew in the rectangles; margining associated text into one or more text blocks; and logically ordering the text books.

Column 7, lines 46-53 as well as Figs. 2A and 2B of Cullen et al. were cited to meet the steps of "binarizing pixels of the BB and generating a pre-processed document image" of the instant application. Figs. 2A and 2B of Cullen et al. merely disclose a document segmentation system wherein a boundary rectangle is used to describe the features on a document, which will define the bounds of a pattern, e.g. a word. Cullen et al. discloses that a rectangle 220 provides a spatial boundary for the word "house" 221 and that a rectangle 230 provides a spatial boundary for the sentence "The house is white" 231. (See Col. 5, lines 50-57 of Cullen et al.). Cullen's disclosure above is

different from compression of bit-mapped representation. More particularly, nowhere does Cullen et al. teach or suggest classifying a document image into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis, binarizing pixels of the BB, and generating a pre-processed document image. Appellants submit that the Examiner makes the assumption that a document image is classified into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis by reading into the Cullen et al. reference. Assuming, *arguendo*, that Cullen et al. teaches that a document image is classified into a Character Block (CB) and a Background Block (BB), nowhere does Cullen et al. teach or suggest that the document image classification is carried out on the basis of a result of a document image pixel analysis. In addition, nowhere does Cullen et al. teach or suggest a Background Block (BB), let alone that pixels of a Background Block (BB) are binarized.

Since the Yokota patent in view of the Cullen et al. patent and further in view of the Nicholson patent does not disclose, teach, or suggest all of the limitations of independent claim 1, Appellants submit that claim 1 is allowable.

2. Independent Claim 15 Is Not Unpatentable

Independent claim 15 is directed to a method for enabling a terminal device to recognize a character image from a document image. The method comprises the steps of (a) designating an operating mode for document recognition; (b) analyzing pixels of the document image in the document recognition mode, classifying the document image into at least one Character Block (CB) and at least one Background Block (BB)

on the basis of a result of the analysis, binarizing pixels of the BB and generating a pre-processed document image. The method further comprises (c) recognizing the pre-processed document image and converting the recognized pre-processed document image into character data; (d) selecting erroneously recognized character data, and correcting or replacing the erroneously recognized character data with input character data in a correction mode; and (e) storing the recognized character data in a storage mode.

As discussed above in Section VII(A)(1), the Yokota patent in view of the Cullen et al. patent and further in view of the Nicholson patent does not disclose, teach, or render obvious the steps of generating a pre-processed document image, recognizing a pre-processed document image and converting the recognized pre-processed document image into character data. The cited references above, alone or in combination, further fail to disclose that the document image classification is carried out on the basis of a result of a document image pixel analysis. In addition, nowhere does Cullen et al. teach or suggest a Background Block (BB), let alone that pixels of a Background Block (BB) are binarized

For the reasons discussed above, Yokota patent in view of the Cullen et al. patent and further in view of the Nicholson et al. patent does not disclose, teach, or suggest all of the limitations of independent claim 15. Appellant submits that claim 15 is allowable.

B. Dependent Claims 2-5, 7, 8 and 16-20 Are Not Unpatentable Over Yokota (U.S. Patent No. 6,334,003) and Cullen et al. (U.S. Patent No. 5,465,304) in view of Nicholson et al. (U.S. Patent No. 6,661,919) and in further view of Li (U.S. Patent No. 7,257,273), Komori (U.S. Patent No. 4,180,798) and Kaplan (U.S. Patent No. 4,799,077).

Dependent claims 2, 5, 7, 16, 19 and 20 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the Yokota patent in view of the Cullen et al. patent and in further view of the Nicholson et al. patent.

Dependent claims 3 and 17 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the Yokota patent in view of the Cullen et al. patent and the Nicholson et al. patent and in further view of the Li patent.

Dependent claims 4 and 18 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the Yokota patent and the Cullen et al. patent in view of the Nicholson et al. patent and in further view of the Komori patent.

Dependent claim 8 is rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the Yokota patent and the Cullen et al. patent in view of the Nicholson et al. patent and in further view of the Kaplan patent.

The deficiencies in the Yokota patent and the Cullen et al. patent noted above with respect to independent claims 1 and 15 are not cured by the combination with the Yokota, Cullen et al., Nicholson et al., Li, Komori and Kaplan patents. Thus, the Yokota, Cullen et al., Nicholson et al., Li, Komori and Kaplan patents do not disclose or render obvious that the document image classification is carried out on the basis of a result of a document image pixel analysis and that the pixels of a Background Block

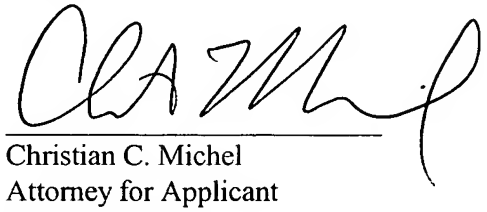
(BB) are binarized, as recited in independent claims 1 and 15. Accordingly, independent claims 1 and 15 are allowable for the above-discussed reasons.

For the reasons discussed above, Yokota, Cullen et al., Nicholson et al., Li, Komori and Kaplan, alone or in combination, do not disclose, teach, or suggest all of the limitations of dependent claims 2-5, 7, 8 and 16-20. Appellants submit that claims 2-5, 7, 8 and 16-20 are allowable.

B. Conclusion

For these reasons presented herein, the Appellant submits that claims 1 and 15 and dependent claims 2-8 and 16-22 are not obvious under 35 U.S.C. §103(a) over the cited references of record. Accordingly, reversal of the final rejection is requested and allowance of claims 1-5, 7, 8 and 15-20 is respectfully requested.

Respectfully submitted,



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VIII. CLAIMS – APPENDIX A

1. An apparatus for recognizing a character image from a document, comprising:

an input unit for generating commands for a recognition mode, a correction mode and a storage mode;

a pre-processor for analyzing pixels of a document image in the recognition mode, classifying the document image into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis, binarizing pixels of the BB and generating a pre-processed document image;

a character recognizer for recognizing the pre-processed document image and converting the recognized pre-processed document image into character data;

a recognition error processor for correcting or replacing erroneously recognized character data selected by the input unit with character data output by the input unit in the correction mode;

a database for storing the recognized character data in the storage mode; and

a display unit for displaying the document image and character data generated during operating of the modes.

2. The apparatus as set forth in claim 1, wherein the pre-processor comprises:

a skew correction part for classifying stripes having a preset length or above from the document image, calculating direction angles of the classified stripes, measuring a skew of an object, deciding a skew angle corresponding to the measured skew and correcting the object skew;

an Region Of Contents (ROC) extension part for classifying the document image in which the object skew is corrected into CBs and BBs, searching for positions of the CBs to extract the CBs and extending a size of an image of the extracted CBs to a size of an input document image; and

an image binarization part for comparing pixels of the CBs for the document image with a pixel threshold value, binarizing the pixels of the CBs into pixels having brightness values for character and background pixels, and binarizing pixels of the BBs into pixels having a brightness value for the background pixels.

3. The apparatus as set forth in claim 2, wherein the pre-processor further comprises:

a blurred-image detection part for classifying the input document image into the CBs and the BBs, calculating an average energy ratio for the CBs, comparing the average energy ratio with a predetermined threshold value, and determining whether the input document image is blurred according to a result of the comparison.

4. The apparatus as set forth in claim 2, wherein the pre-processor further comprises:

a noise reduction part for reducing noise of the extended image output from the ROC extension part and outputting, to the image binarization part, the image in which the noise is reduced.

5. The apparatus as set forth in claim 1, further comprising:

a camera for detecting the document and generating the document image.

7. The apparatus as set forth in claim 5, wherein the character recognizer comprises:

a handwritten character recognizer for recognizing a received handwritten character image in the correction mode and converting the recognized handwritten character image into correction character data necessary for correcting the erroneously recognized character data.

8. The apparatus as set forth in claim 5, wherein the camera adjusts a focal distance and exposure time.

15. A method for enabling a terminal device to recognize a character image from a document image, comprising the steps of:

(a) designating an operating mode for document recognition;

(b) analyzing pixels of the document image in the document recognition mode, classifying the document image into at least one Character Block (CB) and at least one Background Block (BB) on the basis of a result of the analysis, binarizing pixels of the BB and generating a pre-processed document image;

(c) recognizing the pre-processed document image and converting the recognized pre-processed document image into character data;

(d) selecting erroneously recognized character data, and correcting or replacing the erroneously recognized character data with input character data in a correction mode; and

(e) storing the recognized character data in a storage mode.

16. The method as set forth in claim 15, wherein the step (b) comprises the steps of:

(b-1) classifying stripes having a preset length or above from the document image, calculating direction angles of the classified stripes, measuring a skew of an object according to a result of the calculation, deciding a skew angle corresponding to the measured skew and correcting the object skew;

(b-2) classifying the document image in which the object skew is corrected into CBs and BBs, searching for positions of the CBs to extract the CBs and extending a size of an image of the extracted CBs to a size of an input document image; and

(b-3) comparing pixels of the CBs for the document image with a pixel threshold value, binarizing the pixels of the CBs into pixels having brightness values for character and background pixels, and binarizing pixels of the BBs into pixels having a brightness value for the background pixels.

17. The method as set forth in claim 16, wherein the step (b) further comprises the step of:

(b-4) classifying the input document image into the CBs and the BBs, calculating an average energy ratio for the CBs, comparing the average energy ratio with a predetermined threshold value, determining whether the input document image is blurred according to a result of the comparison, and carrying out a pre-process if in the input image is not blurred.

18. The method as set forth in claim 17, wherein the step (b) further comprises the step of:

(b-5) reducing noise of the extended image output from a Region Of Contents (ROC) extension part and outputting, to the image binarization part, the image in which the noise is reduced.

19. The method as set forth in claim 18, wherein the step (d) comprises the steps of:

(d-1) displaying candidate characters corresponding to the erroneously recognized character data in the correction mode; and

(d-2) correcting or replacing the erroneously recognized character data with a candidate character selected from the displayed candidate characters.

20. The method as set forth in claim 18, wherein the step (d) comprises the steps of:

(d-3) displaying a recognition window for inputting a handwritten character in response to a request in the correction mode;

(d-4) recognizing the handwritten character when the handwritten character is input into the handwritten character recognition window; and

(d-5) correcting or replacing the erroneously recognized character data with the recognized handwritten character.

IX. EVIDENCE – APPENDIX B

No evidence under 37 C.F.R. § 1.130, 1.131 or 1.132 is relied upon in this Appeal.

X. RELATED PROCEEDINGS – APPENDIX C

None